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(10) # CANADIAN PATENT

(54) ANGLED VALVE SEAT CLOSURE

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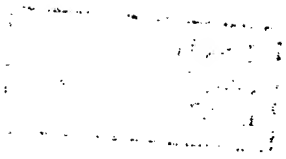
No. OF CLAIMS 1



The present invention relates to an improved unitary molded plastic closure for both rigid and semi-rigid containers including collapsible tubes and the like.

While molded plastic closures have many advantages over most of the prior art closures constructed of different materials, they also have some drawbacks. One of these drawbacks is what is known in the trade as back-off, or cold flow, which is used to express the tendency of the closure to become unseated and/or loose after it has been attached to the container.

This back-off is primarily the result of the changing of temperatures in which the closure and container go through from time to time after they have been filled. This change of temperature causes both members to expand and to contract, and after a number of these expansion and contraction cycles these plastic materials will not fully recover after expansion and therefore the closure becomes unseated and/or loose on the container and in many instances does not provide a seal of sufficient tightness to prevent the contents from leaking. There is of course more back-off of the closure when both the container and the closure are constructed of a plastic material for the reason that the container is also subject to the same expansion and contraction as the plastic closure.

The primary object of the invention is to provide a closure having a seat engaging portion that will effect an improved seal with the sealing seat about the container opening.

Another object of the invention is to provide a closure that will have the same sealing effect on a container constructed of either rigid, or semi-rigid material.

Another object of the invention is to provide a structure wherein a greater pressure may be created by the seat engaging portion of the closure to the sealing seat about the opening

A further object of the invention is to provide a closure that may be used on a variation of container sealing seat.

Still a further object of the invention is to provide maximum sealing between the closure and the container sealing seat and one which may be readily reused without damaging the sealing effect.

Another object of the invention is to provide a closure that will not require a supplemental sealing gasket, or liner.

While several objects of the invention have been set forth, other objects, uses and advantages will become more apparent as the nature of the invention is more fully disclosed consisting of its novel construction and the arrangement of its locking features shown in the drawings and described in the detailed description to follow, in the drawings:

Figure 1 is a sectional view in elevation of the improved closure and a portion of the container showing the closure secured to the container outlet in sealing relationship.

Figure 2 is an enlarged fragmentary sectional view in elevation of a closure similar to that shown in Figure 1 and a portion of the container similar to that shown in Figure 1 wherein, the container is constructed of a rigid material illustrating a modified form of sealing seat.

Figure 3 is a fragmentary sectional view in elevation of a closure similar to that shown in Figure 1 and a portion of a container similar to that shown in Figure 2 formed of a semi-rigid plastic material wherein the closure and container are in unsealed relationship in respect to each other.

Figure 4 is a fragmentary sectional view in elevation of the closure and container shown in Figure 3 illustrating the closure and semi-rigid plastic container in sealing relationship.

Figure 5 is a fragmentary view in elevation of a closure similar to that shown in Figure 1 and a portion of a container showing a further modified form of sealing seat.

Figure 6 is a fragmentatary sectional view in elevation similar to that shown in Figure 1 and a portion of a container illustrating still a further modified form of sealing seat.

Referring to the drawings like reference characters are used to point out like and similar parts throughout the several views. The phase, sealing seat, and/or seat refers in particular to the area about the opening in the container.

The closure A is of a one-piece construction and is preferably substantially of the same consistency throughout its area. The closure is adapted for sealing both rigid and semi-rigid containers wherein the containers are provided with a variety of different forms of seat sealing surfaces and comprises in general a side wall 2, a top portion 3, an angled or conical seat engaging portion 4 and a thread 5 carried by the side wall for holding the closure A downwardly in sealed relationship about the container opening. The seat engaging portion 4 of the closure beginning at its lower edge 4' extends upwardly and inwardly at an angle with a plane running perpendicular to the vertical axis of the closure. While this angle is illustrated as being of substantially 60 degrees, the angle may be increased, or decreased to some extent without changing the sealing effect of the closure, or its operation. The variation that may be made in the angle of the seat engaging surface 4 of the closure A depends a great deal on the type of seat carried by the container and the type of material from which the container is constructed.

The container B illustrated in Figure 1 may be constructed of a rigid material such as glass, or it may be constructed of a semi-rigid material such as may be molded from one of the

well known plastic compositions.

When the container is constructed from a rigid material the back-off is not as pronounced as it is with the use of a plastic container for the reason that there is not as much expansion in the rigid container.

Referring again to the container B in Figure 1, the outer end portion 6 about the opening B" is substantially broad. The closure A is adapted to be screwed upon the neck portion B' by engaging the threads 5 of the closure with the thread 7 on the neck B'. The angled seat engaging portion 4 is adapted to engage the outer edge 6' of the seat portion 6, applying an inwardly force about the opening of the container to seal the opening B". If the closure is also of a substantially rigid type material there is very little, if any movement in either of the two members when the closure and container are in sealed relationship. However, if the closure is constructed of the more elastic material the closure will be slightly expanded when the angular seat engaging surface 4 engages the seat. This expansion of the closure will compensate, to some extent for the cold flow of the plastic material from which the closure is constructed.

If the container is constructed of a semi-rigid material, such as plastic, and the closure is constructed of a more rigid type of plastic, the angled seal engaging portion 6 will squeeze the outer edge 6' about the opening B" of the container, pressing it slightly inwardly to set up a stress between the seal engaging portion of the closure and the seal on the container. This compression stress about the container opening will likewise compensate for the cold flow of the material, or back-off of the closure from the container. The closure while generally constructed of a substantially rigid type of plastic material

which may also allow the closure to be slightly expanded while the area about the container opening is contracted when the closure is in sealing contact with the container seat. This will under some circumstances give a greater allowance for cold flow, and/or back-off than when only one of the two members are of semi-rigid construction.

The container shown in Figure 2, is shown constructed of a rigid material, such as glass, while the closure A is of the same plastic material as used on container B, shown in Figure 1, in this form, the container is provided with a neck C having an opening C' and an upper edge 9 surrounding the opening C'. The sealing area 9' is angled at substantially the same degree as the angled surface 4 of closure shown and described in Figure 1. As the rigid container lacks any appreciable elasticity, the angular surface 9 is formed in substantially the same plane as the angular sealing surface 4 of the closure.

Referring to Figure 3 and 4 the container is shown formed of a semi-rigid plastic material and is somewhat compressible and/or elastic. In Figure 3, there is shown a closure A similar to that shown and described for Figure 1, loosely fitted over a neck D of the plastic container. That is, the closure is not in sealing engagement with the container. In this form of the invention the outer end 11 defines an opening D'. The end 11 of the container is slightly compressible and is formed with an angular surface 11' which is of a slightly greater angle than the angled seat engaging portion 4 of the closure as shown in Figure 3, that is, the inner end of the angled seat 11' is spaced further from the lower end 4' of the angled seat engaging surface 4 than it is at the upper end of the angled seat engaging portion 4', which allows the outer end 11 of the container neck to be pressed inwardly and will allow the perspective angled surfaces 4 and 11' of the closure and container to

coincide when the closure A is fixed tightly upon the container after the edge 11 has been compressed inwardly, as shown in Figure 4 at 11".

In the form of the invention illustrated in Figure 5, there is shown a container of semi-rigid construction having, a neck E and an upper edge 12 extending about the container opening E'. Formed integrally with the neck and extending laterally from the outer upper edge, is a resilient lip 12' having an outer tapered or conical face and an inner substantially radial face and a V-shaped recess 12" extending about the outer peripheral surface of the neck adjacent the upper end thereof, and immediately below the lip 12', whereby the lip is depressible into the groove 12". The angled surface 4 of the closure A engages the upper outer edge of the lip 12" depressing it downwardly into the groove 12". This resilient characteristic of the lip 12" acts to compensate for the cold flow, or back-off of the closure from the sealing seat of the container.

Figure 6 shows still a further modified form of sealing seat for a plastic container, having a neck portion F and an upper end 14 surrounding an opening F' of the container. Extending vertically and above the normal upper end 14, is a narrow flexible ringlike portion 14' formed integrally with the normal neck portion 14 and adapted to engage the angular seat engaging surface 4 of the closure. The portion 14' is of substantially less cross-sectional area than the neck portion F, which allows the ring portion 14' to be flexed more easily than it would normally be if left the full thickness of the neck F, and by being thinner would afford greater elasticity. The operation of the portion 14' is well illustrated in Figure 6. Normally the portion 14' extends upwardly along the line illustrated by the dotted line 12". When the closure A is tightly affixed to the container neck F the angled surface 4 engages the outer

upper edge of the portion 14', forcing it inwardly as shown in full lines. This form is in general similar to the form shown in Figure 5, that is, to reduce the thick neck area of the plastic adjacent the seal which is to be engaged by the angular surface 4 will provide more elasticity between the two elements and provide for a greater degree of cold flow or back-off.

The present closure as it is readily seen will accomodate a wide range of sealing surfaces. Still referring to Figure 6, the neck portion F may be formed as shown by the dotted line 14''', tapering the neck to a thinner outer edge similar to that shown at 14'.

The closure itself may be constructed of a wide range of materials for giving it a calculated amount of flexibility which will allow the closure to be extended laterally when its angled edge engages the container.

THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. In combination a container having a hollow cylindrical neck portion forming the means through which contents of the container may be discharged,
a closure for said container,
cooperating means on the neck portion and in the closure, responsive to rotary movement of the closure for axially advancing the closure on the neck portion and holding the same thereon,
a resilient lip of greater diameter than the neck portion and surrounding the end thereof, said lip having a substantially conical outer face tapering toward the end of the neck portion and a substantially radial inner face whereby the lip tapers to a free annular edge which is thinner than its base
a V-shaped groove in the neck portion adjacent the substantially radial inner face of the lip,
a conical seat engaging surface within the closure, said seat engaging surface tapering away from said cooperating means within the closure, said seat engaging surface having a smaller taper angle than that of the conical outer face of said lip and in position to contact the free edge of the lip as the closure is advanced through the cooperating means and deflect the lip into said V-shaped groove.

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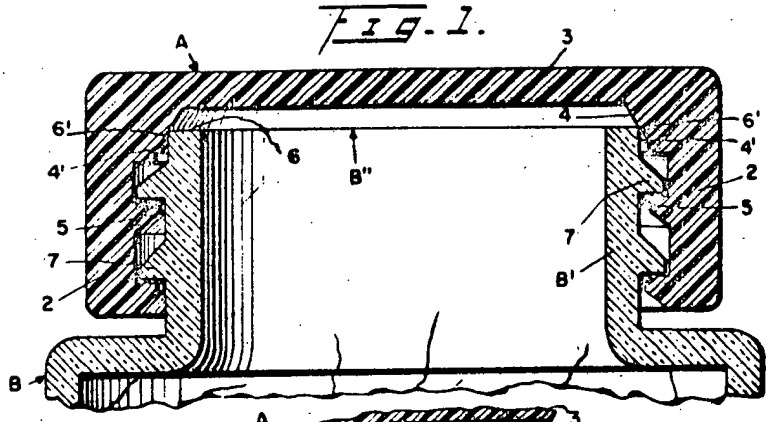
Fig. 1.



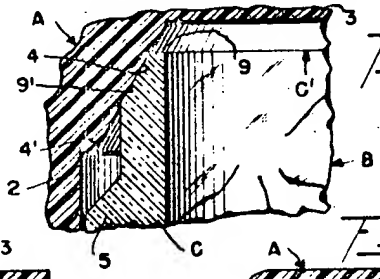


Fig. 2.

Fig. 5.

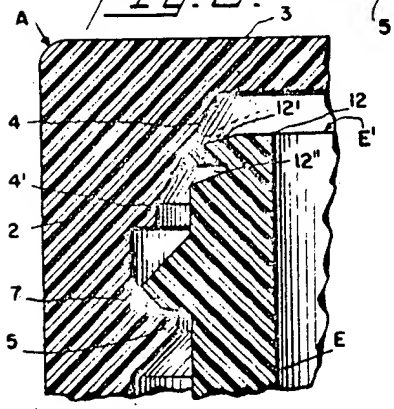
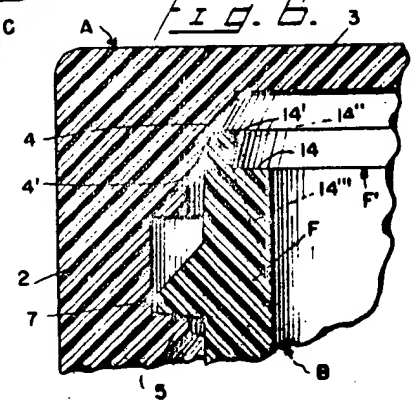


Fig. 6.



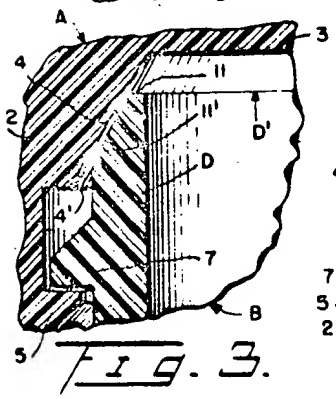


Fig. 3.

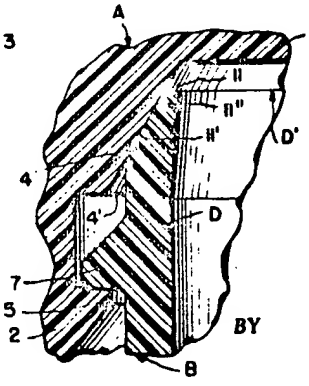


Fig. 4.